Visual supports at home and in the community for individuals with autism spectrum disorders: A scoping review

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Abstract

Visual supports are recommended in autism spectrum disorder clinical guidelines. They can reduce anxiety, increase predictability, support communication and improve participation. They are implemented regularly in schools but evidence about home visual supports is limited. This paper reports results of a scoping literature review, alongside qualitative evaluation with parents and professionals. We report findings from 34 studies, identifying 4 categories of visual support and heterogeneity in participant characteristics, intervention methods, environments and outcome measures. Qualitative data from questionnaires (n=101) and focus groups generated key themes about home visual supports, through thematic analysis: 1) Access 2) Participation focussed 3) Individualisation 4) Teaching methods 5) Consistency 6) Information and Training. We propose consensus with terminology and implications for practice and research.

Visual supports at home and in the community for individuals with autism spectrum disorders: A scoping review

Autism Spectrum Disorder (ASD) is lifelong and affects social skills, communication, flexible thinking and behaviour (SIGN 2016), underpinned by difficulties with theory of mind, central coherence, executive function, sensory processing, and context blindness (Livingston et al., 2018; Pfeiffer et al., 2018; Vermeulen, 2015). These skills are crucial for individuals interacting within the physical and social environment. Communication breakdowns can cause considerable strain, affecting social inclusion and learning and have the potential to affect the entire family system (Buschbacher, Fox & Clarke., 2004). Meaningful exchanges and breakthroughs in successful communication have a significant, positive impact on daily life and relationships (Hines, Balandin & Togher, 2011). Therefore, supporting meaningful communication in autistic individuals and providing appropriate information and training for families should be a priority (Machalicek et al., 2014). Doing so could result in decreased parent stress through prevention of future problem behaviour.

Visual supports

For the purpose of this study, the umbrella term 'visual supports' (VS) refers to a common group of resources, used for various purposes, which are more permanent than words, remaining for reference long after words are gone. At the outset of this scoping review, it was not possible to source a comprehensive list of VS included under this umbrella and therefore we are providing our own detailed definition. Following the review we hope to further clarify terminology and conceptual boundaries.

VS are objects that can be seen and/ or held, which are used to provide information visually to enhance an individual's understanding of: the physical environment; people and the social environment (communication, words, actions, rules and expectations and spoken or unspoken intentions or expectations) and more abstract concepts, such as the passage time, a sequence of events or socially abstract concepts such as emotions or reasons to do something in a particular way. Equally they can support expressive communication, offering an alternative or supplement to speech, signs, gestures or actions. Although individuals may need personal motivation to engage with them, to be taught their meaning and how to use them, VS which match the individual's developmental stage do not in and of themselves involve skill acquisition, rather they are tools designed to help acquire a myriad of skills.

VS are one of the common, psychosocial interventions recommended across the lifespan, for autistic people (NICE 2011; NICE 2012; SIGN 2016; Denne et al., 2018; Pickard et al., 2018). They are either "low-tech": objects, photos, pictures, symbols, written words, or "high tech": on electronic devices. VS may be low cost, adaptable, portable and applicable across contexts; making communication physical and consistent, rather than fleeting and inconsistent like spoken words (National Autistic Society, 2017).VS can also provide structure, routine, and sequence that many children with autism need to engage in daily activities (Rao & Gagie, 2006) thus supporting individuals in unpredictable and changing environments (Arthur-Kelly et al., 2009). VS can be standalone supports or, as is more commonly the case, seamlessly integrated with other individualised approaches, giving an 'overlay effect' (Arthur-Kelly et al., 2009). VS are used alongside interventions from philosophical approaches ranging from the didactic or behaviourially based (Denne et al., 2018) to social pragmatic frameworks (Prizant et al., 2003; Boyd et al., 2014) in school/ community/clinic environments or parent- mediated interventions

(Pickles et al., 2016). It is therefore even more important to develop research in this area. When used, VS have the potential to increase understanding, reduce anxiety, and facilitate participation, support communication and increase independence, thereby reducing the risk of challenging behaviour and supporting inclusion (Baxter, Rutherford & Holmes, 2015). However most research is focused on school rather than home or community environments.

PECS (The Picture Exchange Communication System) (Frost & Bondy, 2002). is a manualized, evidence based intervention (e.g. Ganz et al., 2012a; Ganz et al., 2012b), which applies symbols in teaching expressive communication. It differs from the other VS reviewed here, which are not manualised. Parent-mediated interventions are recommended for young autistic children (Oono et al., 2013) and the crucial role of the family in support for autistic individuals is unquestionable (Arthur Kelly et al., 2009; NICE 2011). Therefore better understanding of how parents engage with home VS is worthy of further study. Home VS is an under-researched area and combining a comprehensive literature review with local evaluation was deemed an appropriate first step due to the need to clarify terminology and conceptual boundaries within the subject area. Where there is limited or heterogeneous evidence, preliminary, scoping reviews can pave the way for a more precise systematic review in future (Peters et al., 2015; Arksey & O'Malley, 2005). Scoping reviews are a recognised method of considering a body of literature, where terminology and conceptual boundaries are yet to be defined. They differ from other systematic reviews, as they provide an outline of existing literature without quality assessment or extensive data synthesis (Armstrong et al., 2011).

Context for the study

This government funded study takes place in a Scottish city (population 500,000). Support for autistic children and their families is provided through public health, education and social care services. The multi-disciplinary additional support for learning service works collaboratively with schools, nurseries and families to provide individualised support, in everyday environments. Parent-mediated, ASD focussed interventions are provided, alongside a range of evidence based interventions. Although VS are recommended, there was a local perception of gaps and inconsistency in their use prior to the study. Embedded in our approach was the assumption that VS are commonly recommended as core practice for children with autism. Our goal was not to decide whether or not VS should be used, but rather to elucidate what barriers and facilitators affect successful implementation and to build a depth of understanding. Thus, as well as reviewing the evidence base, our interest was in how parents and professionals experience home VS, in order to modernise provision, improve efficiency and effectiveness and develop knowledge and recommendations for practice.

Aims

1. Identify literature evidence, fitting specified inclusion criteria, about VS in home settings with autistic individuals and review terminology used.
2. Evaluate parent and professional's experiences of using visual supports at home and in the community with children
3. Use the findings to make recommendations for practice

Methods

In this scoping study, data were gathered through structured literature review and qualitative evaluation with parents and professionals.

Scoping Review

Due to limited consensus on how VS terminology and applications, together with limited high quality evidence within this field, we selected a scoping study framework method (Arksey & O'Malley, 2005), to identify key concepts and the extent, range and types of evidence available in a field of enquiry.

The purpose of this review was to clarify the scope of what is considered to be a 'visual support', provide a comprehensive overview of relevant research regarding the use of VS by families of autistic individuals in 'home' settings, identifying any gaps in the literature which could inform future clinical research. Prior to the study there was a perceived paucity of high quality evidence, no published home VS conceptual framework to support evaluation and although there are VS are more widely reported than others (e.g. visual schedules) there were no reviews identified, which focus specifically on home VS. A scoping review can provide a summary of current evidence related to practice, identify evidence gaps and can also determine the value of undertaking full systematic review in future. The framework applied has six stages.

Stage 1: Identifying the research question

The study aimed to review international literature to address three research questions:

1. What 'visual supports' are used by families to support autistic individuals at home and how are they described?
2. What type of evidence is there that visual supports are used effectively by families?
3. Which factors facilitate or obstruct the use of home VS?

Stage 2: Identifying the relevant studies

Inclusion criteria for studies were agreed: (1) no limit on publication year; (2) English language; (3) published in peer reviewed journals; (4) review or experimental studies; (5) included evidence of VS at home or by parents/carers outwith the school setting, for children or adults with any additional support need. Studies solely reporting on PECS were excluded because, unlike the other VS reviewed, PECS a) is a manualised expressive communication system and b) has sufficient research evidence to identify that it is an effective system for individuals with specific presentations (e.g. Ganz 2012b). Electronic and hand searches were completed and duplicates removed. Two reviewers assessed the study titles and abstracts for relevance, excluding those not meeting criteria. For all articles meeting the criteria, full text articles were reviewed. Any disagreement was resolved through discussion to reach consensus.We made systematic searches of electronic databases (including MEDLINE, PsycINFO, and CINAHL via EBSCO Host). In addition, selected journals were hand searched and reference lists of relevant articles and reviews were examined to identify additional articles meeting inclusion criteria. Final search strings used and a full list of electronic databases are listed in table 1.

[Insert Table 1]

Stage 3: Study selection

After duplicates were removed and abstracts reviewed to ascertain their fit with inclusion criteria, the search identified 54 studies, which were subject to full text review by two members of the team, with 20 of these excluded as they did not meet inclusion criteria, leaving 34 studies in the final review.

Stage 4: Charting the data

A proforma was devised and used to extract data for each study.

Stage 5: Collating, summarizing and reporting results

Key findings were collated, firstly in relation to type of VS and terminology used and then secondly by type of study. Then the type of support, environment, target skills and key outcomes were documented. We wrote a narrative account of findings and did not infer weight of evidence according to a quality rating of studies.

Stage 6: Consultation with stakeholders

Data were summarized in a project report and used to inform consultation with stakeholders, with the purpose of identifying shared themes and areas of discrepancy between experiences of stakeholders and published literature.

Qualitative Evaluation

It is common practice for recipients of an intervention to participate in research supporting the definitions and conceptual boundaries that have real world meaning and can inform future iterations of the intervention**.**

Data Collection

Ethical permission was granted from the local council Research Ethics Committee. Data were collected via questionnaires and focus groups.

a) Questionnaires: Using literature evidence and research-practitioner experience, parent and professional questionnaires were devised by the research team, which we hoped would inform questions and focus group discussion. Survey monkey was the host provider for data collection. An information sheet and ‘glossary’ explained the purpose of the questionnaire and what is meant by ‘visual supports’. Authors can be contacted for copies of these.

Questions included: demographic information; which VS were provided, experiences of training, access to VS, implementing and using VS at home.

b) Focus Groups: Those who had completed questionnaires were invited to attend focus groups to further explore the themes arising. Four groups were held (two for professionals, two for parents), each lasting approximately 90 minutes. Seven parents and 15 professionals attended. Participants discussed experiences and views about VS, using pre-defined questions to structure discussion, concentrating on what works well, what could be better and what would the 'ideal' world look like. All focus groups were audio recorded and written notes taken.

Participants

An opportunity sample was obtained, using inclusion criteria which could yield 'information rich' data (Palinkas et al., 2015) from those with recent experience of home VS. The survey monkey link was open for 4 weeks and shared with a) parents of children up to the age of 13 with a confirmed diagnosis of ASD who had, within the last 6 months, received specialist support and/ or attended parent training and information sessions in the city in 2016-2017 and b) experienced professionals from education and health services providing direct support to mainstream education staff, autistic children and parents. Responses were received from parents (n=30) of children diagnosed with ASD under the age of 11 years. The majority attended a local authority mainstream school or nursery. This number represents approximately 7% of all autistic children under 11, attending mainstream schools in this city. A range of professionals were involved, with more than half involved with Speech and Language Therapists, Paediatricians, Occupational Therapists, Specialist Education staff and school/ nursery staff and Educational Psychologists. Responses were received from a range of professionals (n=71) across these staff groups.

Data Analysis

Questionnaires: Data from survey monkey were exported and descriptive statistics applied.

Focus groups: Data were transcribed verbatim and thematic analysis undertaken to interpret data, following a commonly used method of analysis (Vaismoradi, Jones, Turunen & Snelgrove, 2016). Transcriptions were made and cross checked by two researchers. The transcripts were reviewed and recurrent themes identified through discussion amongst four research team members at each stage of analysis. These themes were then used to systematically code the data, and develop a results synthesis of key points for consideration in the development of service provision for home VS.

Thematic analysis involved several iterations. Parent and professional focus groups were firstly considered separately, through close reading of scripts question by question. An open coding procedure was applied (Morse & Field, 1995) and over a hundred codes were identified relating to what works well (facilitators and solutions) and what could be better (barriers). At the second stage of analysis, codes with similar content were merged and, irrelevant or duplicate codes removed, leaving a list of themes generated by a) parents and b) professionals. At the 3rd iteration these codes were compared to identify themes common across both groups and those unique to each group - there was strong commonality across themes in each group, although each group raised the theme from a different perspective. For example, in relation ‘information, parents raised the need for access to information, training and VS resources and professionals raised the issue of information to empower parents to make and use VS independently and the importance of not assuming knowledge level of parents; Both discussed training but from different perspectives of providing and receiving training. Subsequently, themes were then interrogated further and a final level of abstraction was reached with six meta-themes which

were common to both groups – Accessibility, Participation, Individualised, Teaching Methods, Consistency and Information/ Training.

Results

Literature review: terminology for visual supports

Thirty four articles met the inclusion criteria and were published between 1993 – 2016. The age range of autistic individuals was 1-44 years. We identified inconsistency in terminology included under the umbrella term of visual supports. Some studies conceptualised use of symbols by the family as 'use in community or vocational settings' and therefore we included studies that used these terms. We recommend these terms be included in future literature searches. Use of 12 different types of VS were reported, within various settings including home, which we were able to categorise after the scoping review, under four key subtypes, with different purposes: a) understanding the environment; b) communication supports; c) understanding rules and social expectations and d) supporting consistency across environments (see table 2).

[Insert Table 2]

[Insert Table 3]

No review focussed specifically on home VS. Six review studies were identified which mainly focus on school VS but which reference home and community supports alongside other systematic instructional procedures (see table 3); including systematic, non-systematic reviews and meta-analyses. Key findings (table 3) indicate that VS can provide benefits related to

positive behaviour and communication in home and community settings and that the teaching method affects success. There is a reported need for training and individualisation of supports.

Intervention studies

We identified 21 intervention or experimental studies, focused on VS with individuals, aged 0-40 years, in a range of settings (see table 4).

[Insert Table 4]

Of these, some studies considered more than one environment, home (n=8), community (n=7) and school (n=9).There was a great deal of heterogeneity in type of VS used and interventions methods. Across studies, positive outcomes included improved 'on-task' and positive behaviours, increased independence, reduced anxiety and improved parent-child interaction. There are challenges in drawing strong conclusions from this heterogeneous body of work due to small sample size, ranging from 1 – 83 participants, with n= 179 across all studies. Only three studies had more than 10 participants.

Descriptive studies

Descriptive studies (n=4) provide practical experience-based information regarding a range of home or community VS and implementation guidance (See table 5).

[Insert Table 5]

Qualitative Studies

These studies (see table 6) explored parent or practitioner views and experiences of using VS (n=4). The age range of autistic individuals was 0-44 years. Sample sizes ranged from 4-16 parent/carers or professionals. Common themes across studies were limited access (for parents) to the right information at the right time and time required to make and implement VS. There were positive experiences of using VS in transitions and home-school communication.

[Insert Table 6]

Parent Questionnaire Results

In questionnaires (n-30) (see table 7), home VS support was most frequently provided by education staff. The most commonly used VS were visual timetables, sequence chart for daily routines, social stories, visual home/ school diaries and timers. A range of reasons were cited, for using VS, not using them or for stopping using them and these were explored further in focus groups.

[Insert Table 7]

Supports were most commonly used: to manage transitions, prepare for new events, to teach 'rules', to express feelings, and to explain social expectations. 11/30 parents gave reasons for not starting to use VS: considering them unsuitable due to a lack of knowledge and information, not knowing how to access VS, inadequate support to get started and lacking confidence. 15/30 gave reasons for stopping using them and these were similar but in addition 26.7% of parents (4/15) said they felt they were no longer needed, 60% (9/15) felt they didn't work and 26.7% (4/15) said they were too hard to manage within family life.

Professional Questionnaire Results

Demographic and Professional experience information (n-71) is given in Table 8. Only 23/71 professionals reported receiving home VS training and of those who answered 'no', 95% (35/37) said they would benefit from training. The types of VS used and applications were very similar to parent responses and will not be reported in detail.

[Insert Table 8]

A wide range of themes emerged. Collaborative, multi-disciplinary approaches work well with families, as long as goals are jointly identified and support is well coordinated and consistent. There was a preference for intensive support initially and less intense support over time. Families were clear that they wished to use VS as early as possible (i.e. before diagnosis). There was a preference for VS being individually tailored, clearly demonstrated, and regularly evaluated/adapted. In order to be successful, training is required for professionals and families and resources made easily accessible.

Focus Groups Results

Questions were posed, covering training and information, range and types of VS used, initial and ongoing support, collaboration and consistency (in professional support), barriers/challenges, and future needs and suggestions. Responses were transcribed verbatim and then analysed into themes and subthemes (see Table 9).

[Insert Table 9]

Six key themes were generated between parents and professionals (n=22) (see Figure 1).

[Insert Figure 1]

1. **Access to visual supports**: Accessibility of VS and a means of creating or maintaining individualised resources was deemed essential. Limited access affected 'not starting' or maintaining VS. Timely support was an aspiration, with parents strongly suggesting that support should not be diagnosis dependent but should address identified needs. The need for both 'pre-made, pick up and go' resources as well as the option to make individualised supports was noted.

'It would be brilliant to have a bank of ready-made resources that was standard across the city that you could use as a starting point to individualise'

2. **Participation focussed**: Participants discussed the importance of VS being meaningful, purposeful and relevant to the individual child in their natural environments, together with the child's opportunities and motivation to use them. Positive experiences were reported of VS used in this way, improving children's participation in day to day or social activities.

'Having access to the right overall support, people who understand what your child's difficulties are and therefore can help overcome with a big picture view rather than just suggesting random possible solutions.'

3. **Individualised planning:** There was strong agreement that individualisation is essential, in observation and assessment, teaching and review. Professionals requested a structured

assessment processes to support individualisation of developmentally appropriate VS, linked to current priorities for the child and family.

Support needs to be individualised. It may seem time intensive but I think the pay off is worth it as you get families who then go on and really use them and develop their own….Parents have got a lot of ideas and support from each other and come up with some brilliant new ideas'

4. **Teaching methods: Getting started and keeping going**: Participants described an initial stage, when adults must be confident, persistent and directly teach the autistic individual how to use VS. Simply placing VS in the environment is not enough and parents were sometimes given VS without practical help. They had a negative experience and viewed the supports as not relevant to them. Participants proposed the need for a forum to discuss adaptation over time. The importance of trusting relationships between parents and professionals arose.

'We need support through the stages'

5. **Consistent across home, school and community settings:** Participants gave examples of practice, which supported consistency (e.g. Visual home-school diaries, communication passports and using VS in transition planning). They also gave examples of supports used successfully in one context but not others. Parents sometimes carry the burden of ensuring consistency but stated that it works best when this is a shared responsibility. Parents also reported challenges of consistency between family members in attitude or practice with VS and the need (at times) for emotional support to accept this adapted way of being.

'I am always unsure as to whose role this is and feel that I maybe don't put as much time into it as a feel someone else may also be doing the same. I think that you then end up with two half hearted attempts and no full system in place'

6. **Information and Training**: Knowledge and understanding of VS was key to success. Participants reported a need for training and practical information. They requested video examples, signposting and recommendations to apps, websites, books or online resources. Professionals expressed concern about the risk of overwhelming parents and the need to give the information in the right way and pace for parents.

> *'A sheet/pack showing the types of visual support available would be useful'*
>
> *'Giving information on visual supports would be useful at the diagnosis meeting - perhaps a website to go to or a workshop to attend where parents can get free supports from the NHS'.*

Discussion

This scoping study has combined evidence from a structured literature review and consultation with parents (n=30) and professionals (n=71) with experience of using home VS. The purpose of the review was to clarify terminology and to provide a comprehensive overview of relevant research regarding VS for autistic individuals in home settings. A further purpose of the review was to identify gaps in the literature to inform future clinical research. Results indicate a paucity of high quality evidence, no published home VS conceptual framework to support evaluation and although some VS are more widely reported than others (e.g. visual schedules) there are no reviews to date which focus specifically on home VS.

Terminology

In order to develop better evidence, well defined and consistent descriptions of each type of VS is required. Four common categories of VS were identified, with the following functions:

a) Understanding the environment; b) Communication supports; c) Understanding rules and expectations and d) Supporting consistency across environments (see Table 2). We propose this terminology as a framework for visual supports future research and practice.

Research evidence for home visual supports

We identified 34 studies published between 1993-2016, which met inclusion criteria with only 11 specifically reporting VS for autistic individuals in the home or community (e.g. Arthur Kelly et al., 2009). Although there is some evidence of the benefits of home VS, research reported is still heterogeneous, with limited high quality evidence.

Parent and professionals experiences of using home visual supports

Participants with recent experience of providing or receiving support for autistic children, were consulted. Questionnaires identified: the most commonly used VS were visual timetables, sequence charts for daily routines, social stories, home/ school diaries and timers; parents had many positive experiences of using VS, however support could be improved through information and training and support to start, maintain and develop use of VS over time. Questionnaire outcomes informed focus group questions and thematic analysis of transcribed focus group data, led to six key themes (Access, Participation, Individualisation, Teaching methods, Consistency and Information). These resonated with the literature review, strengthening the evidence to underpin the implications outlined below.

Implications for practice

Focus groups were supported by research evidence.

Access: Parents need timely access to training, information, resources and practical and emotional support, either from other parents (Machalicek et al., 2014) or from well trained, knowledgeable multi-professional teams, with adequate VS resources. Some solutions identified through review were 1) Developing a bank of pre-made commonly used VS (Vaz, 2013; Donato et al., 2014), 2) Participants suggested building knowledge amongst professionals about the importance of home VS and supporting family access. 3) Additionally, the use of the 'boardmaker in libraries' model (Tutin, 2013) was identified, allowing families equitable access to the facility to make VS and professional/ peer support.

Participation: Research studies describe the need to implement VS, integrated in a seamless way into other supports and the importance of setting meaningful and motivating goals (Arthur-Kelly et al., 2009). Focus group feedback suggested that this is precisely the way successful supports were used. In contrast, other parents gave up VS because they did not work, which may be attributable in part to inadequate focus on individual motivation. The use of a multi-disciplinary team working in partnership with parents is recommended (e.g. Bopp et al., 2004). Communication is necessarily a social experience; requiring other people and is best learned in a social context. Interventions, which take place in a naturalistic context, (such as VS) are likely to be cost effective and potentially yield greater outcomes (Walker & Snell 2013).

Individualisation: The need for supports to be individualised and developmentally appropriate is a strong recommendation (Marshall & Mirenda, 2002; Rao & Gagie, 2006; Meaden et al., 2011; Knight, Sartini & Spriggs, 2015). Use of a 'child profile tool' could support this process (Stoner et al., 2007). Poorly individualised planning for VS may explain some 'failures'. Assessment of appropriate forms of visual representation (objects, pictures, technology) is difficult and must be based on pragmatic judgements as well as understanding the child's stage.

For example, in the early stages of PECS, the type of picture does not influence acquisition rates (Angermeier et al., 2008). However when VS are used to aid comprehension, use of the wrong symbolic level could inhibit uptake. No tool is readily available to support clinical decision making. We recommend the development of an assessment and planning tool for VS based on developmental stages.

Teaching adults: There is emerging evidence about effective naturalistic teaching and coaching methods. Machalicek et al. (2014) reviewed parent training interventions focussed on children's communication and report the following components are commonly used: verbal explanations and discussion; written information and training activities, such as role play. However, they also stated that there is a need for ongoing maintenance support, with limitations in 'one off' training programmes. ASD focussed parent programmes are more effective if they include target setting and individual coaching rather than training alone (Weitzman, 2013). Several studies reviewed, provide evidence about effective parent training interventions, suggesting parents learn best with systematic instruction at the right level of intensity (Arthur- Kelly et al, 2009). Meaden et al (2014) trialled an intensive home based teaching and coaching programme involving three 1:1 training sessions, followed by 2-3 coaching sessions per week over 4 months. This evidence indicates likely benefits of a Home VS parent programme.

Teaching children: Children may need to be explicitly taught to use VS, with agreement on teaching strategies, e.g. prompts, modelling, graduated guidance and persistence, for each individual and context (Morrison et al., 2002; Banda & Grimmet, 2008). Systematic instruction enhanced teaching and use of VS (Knight et al., 2015). In focus groups, parents reported the challenge in being given VS but lacking skill/ support to teach their child to use them effectively. Effective generalisation and maintenance of learning does not 'just happen' but needs to be

planned for and promoted (Rao & Gagie., 2006; Bellini & Akullian, 2007; Arthur-Kelly et al., 2009; Meaden et al., 2011; Donato et al., 2015). As individuals get older, self-management of VS is recommended (Lequia, Machalicek & Rispoli, 2012). There is no clear evidence from the literature reviewed about the optimal frequency and amount of group or 1:1 sessions. Time limitations to make and implement home VS is cited as a barrier (Meaden et al., 2011; Hayes et al., 2010; Donato et al., 2015). Families may be particularly 'time poor', therefore in planning for service provision, an important factor will be time requirements from parents and professionals, balanced with successful outcomes.

Consistency: Value is placed on consistency across settings. Foster-Cohen & Mirfin-Veitch, 2015, trialled a co-ordinated home-school VS programme, with positive qualitative evaluation. The model includes joint parent-professional meetings for planning, coaching and modelling, monitoring of generalisation and review. Professional- family collaboration is commonly reported as core practice and supports joint consideration of common sources of challenge for families (Cassidy et al., 2008; Stoner et al., 2007; Foster-Cohen & Mirfin-Veitch, 2015). Mobile technologies can be portable, highly motivating and have the potential to increase access to VS, consistency between settings and reduce time demands (Donato et al., 2015). For some, the desire to 'play' on their device might lessen its usefulness use as a communication device, making 'low-tech' solutions preferable.

Information: Parents are more likely to invest time and effort and to experience success with home VS if they have access to clear information and evidence about how to use them (Donato et al., 2015; Rao & Gagie., 2006). Participants asked for more information and training about VS. The literature review suggests professionals need training in: skills of teaching, modelling and coaching others through supervised practice and verbal feedback (Krantz, et al., 1994); skills

to lead collaborative support planning, build relationships with parents, assess developmental stage and communication needs in naturalistic contexts and understand how to individualise and adapt plans via review (Marshall and Mirenda, 2002; Meaden et al., 2014).

Conclusions

This study adds to an emerging body of home and community VS research for autistic individuals. VS have been used successfully, however, the number and quality of studies limits the possibility of drawing strong conclusions. The dynamic nature of successful implementation of home VS provides challenges to researchers – with the need for contextual relevance, individualisation and adaptation over time. Practitioners and Researchers would benefit from consensus in terminology, assessment/ planning protocols and participation focussed tools for measuring outcome. There is a need for larger scale research studies in this field and future systematic review as the evidence grows.

Recommendations

The study identified barriers and facilitators for parents in using visual supports and guidance on assessment and teaching techniques. Based on this we propose the following model for home visual support intervention, which is not diagnosis dependent and integrated into existing support provision:

1. Families as equal partners
2. Support for families to make VS resources independently
3. Assessment and planning processes which are multi-disciplinary, dynamic, participation focussed, developmentally and functionally relevant
4. Support ‘time friendly’ access to VS for professionals and parents.

5. Provide family friendly information and signposting
6. Provide flexibility of access professional support, to include a more intensive start-up option, drop in sessions, peer support, home support, parent training, coaching and modelling
7. Professional training and awareness raising
8. Supporting consistency across settings with ‘symbol sets’ and templates of commonly used resources

Limitations

The literature review was non-systematic and therefore potentially less robust. The reasons for this are the small body of work describing a heterogeneous and inconsistently defined intervention. Studies reported are small scale with limited potential for generalising findings. A further limitation in the qualitative aspect of the study was the opportunity sample, which included parents/carers of autistic children who had received recent support in one locality and may not be fully representative of all parents of autistic children. We did not explore response bias in relation to which participants decided to participate in focus groups. For parents juggling childcare, work and financial challenges, it is likely that availability of childcare, transport and location of the groups influenced the group attending. This was not a randomised group and did not include those who had not accessed support. For these reasons we must interpret the generalisability of results with caution.

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Figures and Tables

Figure 1: Key themes from parent and professionals focus groups

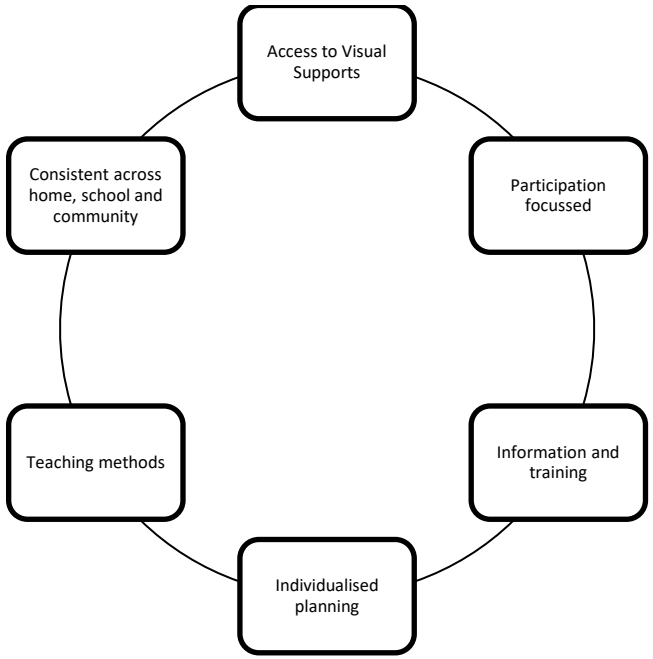

Table 1. Key words and databases used to identify studies providing evidence about use of VS at home

Key words and combinations of key words used in each search string	Databases searched
• visual support, visual timetable, schedule, visual cues, symbol supports, picture cues, picture symbols, Boardmaker©, AAC, alternative and augmentative communication, low tech • autism spectrum disorder, ASD, autism, Asperger's, communication impairment, learning disability, learning difficulty, special educational needs, additional support needs • child, pre-school, school-age, adolescent, teenager, adult • parent, carer, mother, father, family, parent intervention • home, home setting, home environment	PsycINFO ERIC Science Direct CINAHL plus with full text MEDLINE Health Business Elite Cochrane database of systematic reviews

Table 2: Terminology used to describe 12 types of visual supports (bold headings indicate our preferred label for each resource)

Type of Visual Support	**Author(s) who included this in their study or review**	**Activities that the Visual Supports were used for (if detailed in study)**
A. Understanding the environment: These supports are designed to help individuals to understand and access a range of situations independently of people, to increase predictability and desirability of new or routine activities and to understand a sequence or the passage of time		
1. Visual Schedules: This term applies to schedules, timetables and sequence charts which use visuals, ordered to indicate a sequence of events occurring across a specified time period. They can be of varying lengths and refer to a range of daily or social routines. Typically the adults prepare the timetable in advance and the individual with ASD is taught to manipulate it to mark the passage of time or steps in the sequence. Levels of support and cueing may vary from highly adult prompted to being used totally independently by the individual. Success is likely to be dependent on the individual being taught the meaning and purpose of this timetable, how to use it and the social context where the adults support the experience so that the individual trusts that it is true and will happen. This support could be used to support communication about this routine or any changes to the expected routine, comprehension, memory, independence, self or mutual regulation. Use of a timetable is a taught skill and a communication and learning support.		
Visual Schedule (e.g. daily schedule, mini schedule)	Meadan et al (2011)* Meadan et al (2014)*	To: illustrate what activity is taking place; specify what activity will occur next; indicate when an activity is finished; identify any changes that might occur in a regular schedule and specify the morning routine.
Visual Schedule	Dettmer et al (2000)	Leisure and homework activities
Visual Schedule	Marshall & Mirenda (2002)	Dressing, shopping, toileting, bathing, hand washing teeth brushing, mealtime routine.
Visual Schedule	Bopp, Brown & Mirenda 2004	To predict future events
Portable Visual Schedule	Dettmer et al (2000)	Leisure activity.
Picture Schedule	Stoner et al (2007)*	Transitions from task to task, home to school, home to community activity, or transitions based on frequent situational changes e.g. having a substitute teacher.
Written List	Stoner et al (2007)*	
Visual Timetables	Foster-Cohen & Mirfin-Veitch (2015)	Not specified, but linked to daily routines and activities.
Activity schedules (a sequence of VS in either photographic, line drawing, video format)	Banda & Grimmet (2008) Lequia, Machalicek & Rispoli (2012) Morrison et al (2002)	Social interactions, on-task and transition behaviours. Self-regulation, independence, transition, play, play skills.
Event timetable and portable version on key fob	Vaz (2013)	Preparing child for what will happen at dentist visit.
Visual Activity Schedule (VAS) defined as: a sequence of visual cues such as pictures, written words, objects including work systems with visual prompts for instruction of chained tasks	Knight et al (2015)	Daily living tasks such as: laundry/cooking; to assist the completion of homework and after school activities; and work skills in a job site.
Work task schedule	Dettmer et al (2000)	Leisure and homework activities
Photographic activity schedule	MacDuff, Krantz & McClannahan (1993); Krantz, MacDuff & McClannahan, (1993)	Hanging coat up, putting away lunch box, getting snack, obtaining toys and putting them away, using play materials and finding an interaction partner.
Pictorial self-management tool	Pierce & Schreibman (1994)	Setting the table, making a bed, making lunch, making a drink, getting dressed, doing the laundry
Visual sequence chart	Clarke, Dunlap & Vaughn (1999)	Getting dressed and ready for school; homework and bathing routines.
Task analysis strip	Buschbacher, Fox & Clarke (2004)	Dinner routine, watching television and bedtime routine.
Visual task analysis	Meadan et al (2011)*	Visuals to support a child's independence in everyday multi-step tasks like getting dressed, brushing teeth or washing hands

	Meadan et al (2014)*	
Basic morning schedule	Stoner et al (2007)*	Transitions from task to task, home to school, home to community activity, or transitions based on frequent situational changes e.g. having a substitute teacher.
Icons for each task	Stoner et al (2007)*	
'a whole sheet with several different images that they ticked off with a marker pen as they were completed' (not actually given a label)	Foster-Cohen & Mirfin-Veitch (2015)	Daily living routines and activities (e.g. getting up and dressed, getting breakfast, packing bag, doing homework, doing chores and bedtime routines); toileting.
Visual sequence - photos/line drawings and video prompts compared	Mechling & Gustafsen (2008), Mechling, Gast & Seid, (2009).	Cooking related tasks.
Visual sequence	Cagetti et al (2015)	Dental procedures.
Picture booklet or video clips	Van Laarhoven et al (2010)	Daily Living skills (e.g. laundry, cooking)
'Reminder' visuals	Foster-Cohen & Mirfin-Veitch (2015)	To take medication. To let them know who is picking them up and what they need to take (e.g. when in split custody).
Rule reminder boards Visual rule reminder cards	Meadan et al (2011)* Meadan et al (2014)*	Present expectations for behaviour, e.g. a single stop sign, or a sequence showing toilet rules, e.g. no feet on kitchen table
2. Timers: These can be low tech or high tech and are placed where the individual can see them to help them understand how long a current situation or activity will last and it gives them information about when it will finish		
Timer	Dettmer et al (2000)	Leisure and homework activities.
3. Environmental Visual Labelling: These are visuals which clarify what happens in a particular space or what is contained/ located in that space		
Visuals to structure the environment	Meadan et al (2011)*	Structuring and labelling of environment e.g. to represent the specific places where items belong. Also, visual images can help identify tasks that are completed in specific locations.
B. Communication Supports: These supports are used within a communication framework to assist in understanding of communication, intentions, desires or behaviour of other people or to assist with expressive communication, for a wide range of communicative purposes		
4. Object Signifiers and photographs: Some papers report the use of objects or photographs which can help individuals to understand (e.g. coat means we are going out). Developmentally these are usually understood at an early stage than visual symbols or written words		
Real objects	Donato et al (2014)*	-
Photographs and pictures of objects or other concepts	Donato et al (2014)*	-
5. Choice Boards: This type of a support has a set number of visuals to let an individual see what their options are. They can then use this board for understanding and for expressing the choice they have made (by pointing, by placing the symbol on a 'choose' spot and going independently to the chosen activity or by giving it to a person)		
Choice chart	Clarke, Dunlap & Vaughn (1999)	Getting dressed and ready for school; homework and bathing routines.
Choice board	Buschbacher, Fox & Clarke (2004) Rao & Gagie 2006*	Dinner routine, watching television and bedtime routine playground activities.
Choice making symbols	Marshall & Mirenda (2002)	Mealtime choices.
6. Social interaction supports: These visuals are usually created with a particular social routine or situation and can allow a child to understand the turns in the routine and to how or when to take a turn		
Turn taking board	Buschbacher, Fox & Clarke (2004);	Dinner routine, watching television and bedtime routine. To extend/develop play skills.

7. Picture Exchange Communication System (PECS): This is a manualised structured intervention to teach individuals to exchange a picture (or object) with another person to request in the first instance. PECS users can follow different stages in the programme until becoming proficient two way communicators for a range of purposes, in a range of contexts		
PECS	Howlin et al (2007); Flippin et al (2010); Ganz et al (2012a); Ganz et al (2012b); Hart et al (2010)	Teaching Spontaneous expressive communication starting with requesting desired objects and gradually building communicative purposes
C. Understanding rules and social expectations: These supports help individuals to understand what is expected of them in particular contexts and what the consequences might be depending on how they act		
8. Reward chart: These are visuals used where the individual is given a 'visual' reward such as a sticker, a tick, a happy face etc… and a certain number are collected before they can receive a reward		
Reward chart	Clarke, Dunlap & Vaughn (1999)	Getting dressed and ready for school; homework and bathing routines.
9. Social Stories: These are described by Carol Gray and individually devised stories which follow set guidance on style, content, and use to help an individual understand and be prepared for a particular situation. They can be presented with words or pictures		
Social Story	Stoner et al 2007*, Rao & Gagie 2006*	Transitions from task to task, home to school, home to community activity, or transitions based on frequent situational changes e.g. having a substitute teacher. Visit to Dentist. Playground rules such as lining up.
Visual Scripts	Meadan et al (2011)*	To initiate conversations To clarify social topics a child may not fully understand or may interpret inappropriately. Solving problems.
Social scripts and comic strip conversations	Meadan et al (2011)*	Understand social behaviour, demonstrate appropriate social behavior; tell children how to respond in a social situation. To develop/extend play skills.
10. Technology based VS: These are apps which support receptive or expressive communication and/or understanding the **environment**		
Pictures displayed using the iPad, iPod and iPhone mobile technologies	Donato et al (2014)*	-
iPod activity schedule	Carlile et al (2013)	Leisure activities.
Mobile technology (smartphone)	Donato et al (2014)*	Video modelling of activities in a sequence, using video segments recorded on a smartphone to encourage a child through an activity.
Proloquo2Go application software	Donato et al (2014)*	-
D. Supporting consistency across environments: These are supports used to share information between adults who engage with an individual in different settings, to support consistency of practice and they can be an environmental or a communication support depending on how they are used		
11. Communication Passport: This is a document which outlines personal information that can be shared, especially when moving to a place with unfamiliar people or to a new place. It might describe an individual's interests, preferences, how they communicate, what supports their self or mutual regulation and anything they strongly dislike or react badly to and other relevant information.		

Child Profile	Stoner et al (2007)*	Transitions between settings e.g. starting a new school.
12. Home-school diaries: These come in different forms (with pictures or words) and allow the family and staff to communicate and share information between different contexts, to help understand what kind of day an individual has had and why they might be finding a day enjoyable or difficult, to support preparation to make each day desirable and predictable and to support an individual to communicate about experiences in different contexts		
Daily communication note book between home and school	Stoner et al (2007)*	Communication between home and school.
Visual Cueing System (VCS) described as tool containing consistent pictures/words but with written comments that changed.	Murdock & Hobbs (2011)	Communication of the activities of their school day to both teachers and parents (when they picked child up from nursery)
VS to ease and enhance communication between home, school and student.	Rao & Gagie (2006)	Home school communication diary.

*These studies were overviews/systematic reviews of VS in general, so the authors had not personally studied or evaluated them, but had come across in other studies and so list/describe them in their own papers as being pertinent; so are included here.

Table 3. Summary of review studies about visual supports (n=6): Descriptive reviews, systematic and non-systematic reviews and meta-analysis

	Author (Publication Year)	Study Design	Country	Age range (yrs)	Sample Size	Diagnosis	Type of Visual Support	Visual Support environment	Target skill	Key Outcomes Reported
1	**Arthur-Kelly et al (2009)**	Selective Review	Australia	N/A	N/A	**ASD**	A range of visual supports	**Home** Community	Communication	• Many benefits of VS for children and adults with ASD. • Limited evidence of VS in home/ community • Need for parent training
2	**Banda & Grimmett, (2008)**	Non-systematic Review	USA	3-40	31	**ASD**	Visual Timetables (VT)	**Home** Community School	Social interactions Positive behaviours	• 13 studies • 6 refer to transition to home settings • Increased social interactions, on-task and transition behaviours across studies. • Type/mode and training strategies affect success.
3	**Bellini & Akullian (2007)**	Meta-analysis	USA	3-20	73	**ASD**	Video modelling and visually cued modelling	Community School	Social interaction Functional skills and positive behaviour	• 23 single subject designs included. • Both intervention method effective to address social communication, functional skills, and behavioural functioning.
4	**Knight, Sartini & Spriggs (2015)**	Non-systematic, comprehensive review (1993 - 2013)	USA	3-21	56	**ASD**	Visual activity schedules (VT) Video and picture based	**Home** School Work place	Positive behaviours	• 16 studies • 2 home studies • VS are an EBP for ASD, particularly when systematic instructional procedures applied • Approaches should be individualised.

										• Video and picture VAS (Visual Activity Schedules) were beneficial in teaching a range of behaviours.
5	**Lequia, Machalicek & Rispoli (2012)**	Systematic Review (18 studies)	USA	3-18	43	**ASD**	Visual Timetables	**Home** School	Challenging behaviour	• 18 articles. • 5 home studies Visual timetables effective in reducing challenging behaviours in all studies
6	**Walker & Snell (2013)**	Meta-analysis	**USA**	0-over 18	111	**ASD** ID Emotional behavioural difficulty General delay Sensory impairment	AAC interventions including PECS	**Home** Community School	Challenging Behaviour	• 54 studies • 20/54 home studies • Parent delivering intervention. • AAC supported communication and decreased challenging behaviour • Support early intervention – results better with children under 12 years. • Need for training professionals and parents. • AAC interventions in naturalistic settings are cost effective and potentially yield greater outcomes.

Table 4. Summary of intervention studies evaluating the use of Visual Supports (VS) with individuals diagnosed with ASD and other additional support needs Age Range 1-40 years. (n= 20)

	Author (Publication Year)	Study Design	Country	Age range (yrs)	Sample Size	Diagnosis	Type of Visual Support Reported	Visual Support environment	Target skill	Key Outcomes Reported
7	**Baxter, Holmes & Rutherford 2015**	Mixed method	UK	5-12	**5** primary schools	Additional support needs	Environmental labelling (whole school and classroom) Visual Timetable	School	Communication Participation Inclusion Equality	The VSP model of implementation: • Raised staff awareness. • Provided relevant practical resources and improved access to VS in school • Changed practice in mainstream school • Had a positive impact on children • Supports collaborative working between health and educational staff.
8	**Bryan & Gast (2000)**	ABAB withdrawal design	USA	7-8	4 children	**ASD**	Visual activity schedules (VT)	School	On-task and on-schedule performance.	• Increased independent on-task performance.
9	**Buschbacher, Fox & Clarke, 2004**	Single case study Multiple baseline design across daily routines	USA	**7**	1 child	**ASD** Landau Kleffner	Sequence Chart Choice Board Turn Taking board	**Home**	Challenging behaviour Engagement in identified daily living routines	• Challenging behaviour decreased. • Child's engagement increased. • Sleep improved • Positive parent-child interactions increased. •
10	**Cagetti et al (2015)**	Cohort study	Italy	6-12	83 children	**ASD**	Visual sequence charts for dental surgery	Community	Engagement in oral examination and treatments.	• A multi-stage visual protocol for dental procedures. • Of 44 subjects who required restorative

										treatments – only three refused.
12	**Carlile et al (2013)**	Multiple probe across participants	USA	8-12	4 children	**ASD**	Technology Based Visual Timetable	**Home**	On-task performance Independence in Leisure activities	• Increase in use of visual timetable and on-task performance. • Timers on iPod touch lessen dependency on adults.
12	**Clarke, Dunlap & Vaughn (1999)**	Reversal Design	USA	10	1 child	**Asperger Syndrome**	Visual Sequence Choice Board Reward Chart	**Home**	Problem behaviour. On-task in morning dressing routine	• Decrease in problem behaviours. • Increase in on-task performance. • Reduction in the time required to complete the morning routine.
12	**Dettmer et al (2000)**	ABAB Single subject reversal design	USA	5-7	2 children	**ASD**	Visual Timetable Sequence Charts Timer	**Home** Community	Transitions	• Decreased latency time. • Reduction of verbal and physical prompts for one boy. • Decrease in transitioning time for the other boy
14	**Duttlinger et al (2012)**	A-B-C-B-A-B Withdrawal design	USA	11-15	4 children	**ASD** Intellectual Disability	Visual Timetable (daily and task activity schedule)	School Community	Independence	• Increased independence in complete a sequence of three or five tasks following verbal directions.
14	**Foster-Cohen, & Mirfin-Veitch, (2015)**	Experimental, withdrawal design	New Zealand	5-11	23 children	DCD Dyspraxia ADHD, Specific Learning difficulty dyslexia and anxiety	Visual Timetable	School Community	To evaluate the effects of VS in supporting children with disabilities access the curriculum in mainstream settings	• Designed, delivered and evaluated an individualised home school VS programme. • VS benefits children and adults with a range of additional support needs • VS reduced anxiety and frustration, provided reminders of tasks, and increased involvement in school and home routines.

										Positive impact on distractibility, task completion, independence and perseverance. • Benefits of using VS across contexts.
15	**Krantz, MacDuff & McClannahan (1993)**	Multiple baseline across participants	USA	6-8	3 children	**ASD**	Sequence Charts	Community	Engagement Social initiation Challenging behaviour	• Increased engagement and social initiations. • Decreased challenging behaviour
16	**MacDuff et al 1993**	Multiple baseline across participants	USA	9-14	4 children	**ASD**	Photographic activity shedules	Residential **Group Home**	On-task On-schedule behaviour.	• Sustained engagement enabled child to independently change activities and do this in different settings without adult supervision or prompts
17	**Marshall and Mirenda 2002**	Case study	Canada	4	1 child	**ASD**	Visual Timetable Choice Board	**Home**	Problem behaviour Choice making skills	• Decreased problem behaviours. • Increased choice making skills. • Positive behaviour support and family-centred intervention. • Necessary to tailor VS to the needs of individual child and family. • Child involved in making VS.
18	**Meadan et al 2014**	Within subject multiple baseline design	USA	2-5	5 children and their parents	Down syndrome	Visual Timetable Sequence Charts Visual Rule reminder cards	**Home**	Social pragmatic communication skills	• Detailed outline of intervention programme. • Average period of intervention was 4 months with 3 training sessions to each parent in their own home.

										• Parents and children benefited from the intervention. • The trainer/ coach-family working relationship was key to success.
19	**Mechling & Gustafson (2008)**	Adapted alternating treatment design	USA	15-21	6 young adults	**ASD**	Static pictures compared with video prompting	School	Cooking related tasks	• Both approaches were effective in increasing the number of correct tasks accomplished, however participants carried out more tasks independently with the use of video prompts.
20	**Mechling, Gast & Seild (2009**)	Multiple probe design across tasks	USA	16 - 17	3 young adults	**ASD**	PDA with picture, audio and video prompting	School	Using a portable self prompting device in cooking tasks	• All 3 students increased their ability to carry out tasks and were able to adjust the level of prompting they needed independently.
21	**Morrison et al 2012**	Multiple baseline across participants	USA	4-5	4 children	**ASD**	Visual Timetable	School	On-task behaviour Play	• Increased on-task and play. • Using visual timetables on their own were not adequate to support engagement in the task. Systematic instruction was also necessary.
22	**Murdock & Hobbs (2011)**	Multiple baseline across subjects	USA	5	3 children	**ASD**	Home-School Diary	School	Re-telling events of school day to teachers and parents	• All 3 participants increased the number of daily events they reported. • A consistent visual framework, rather than a script may suffice for higher functioning children with autism.

23	**Pierce & Schreibman (1994)**	Multiple baseline across behaviours	USA	6-9	3 children	**ASD**	Sequence Chart	**Home**	Independence in daily living skills	• All children accomplished all tasks in settings without an adult present.
24	**Van Laarhoven et al (2010)**	Adapted alternating treatments design	USA	13-14	2 children	**ASD**	Sequence Chart - comparing use of pictures and video prompts	School	Daily Living skills (laundry, cooking)	• Both methods of prompting were beneficial, but that the video was more efficient in skill acquisition, and more effective in terms of cost and time.
25	**Vaz (2013)**	Action research	UK	children	20 children	**ASD** Down syndrome	Visual symbols to represent healthcare procedures. Sequence strip Environmental visual labelling Instructional symbols	Community	To help children know what to expect in terms of medical examinations and treatment procedures.	• 50 health care professionals trialled the 150 symbol pack across 12 clinical areas in the hospital and community setting. • Symbols were trialled with 20 children when attending a special school clinic. • Parents positively evaluated the symbol pack
26	**Watanabe & Sturmey (2003)**	Multiple baseline across subjects	USA	22-40	3 adults	**ASD**	Visual Timetables Choice making	Adult Services Programme	Choice making Participation	• Results showed that incorporating choice making into visual timetable increased time on-task for all participants. • Results may be dependent on the adults already having choice making skills.

Table 5. Summary of descriptive (non-experimental) articles reporting the use of Home Visual Supports (VS) for children with ASD and other additional support needs (n=4)

	Author (Publication Year)	Study Design	Country	Age range	Diagnosis	Type of Visual Support Reported	Visual Support environment	Focus of study	Key Outcomes Reported:
27	**Bopp, Brown & Mirenda 2004**	Descriptive	USA	Children	Develop-mental delay	A range of AAC modalities: Symbols, Signing, voice output device A range of supports, including Visual Timetables and PECS	**Home** Community School	Functional communication Training with VS Role of SLT in VS	• SLTs have an important role in VS. • Need for systematic symbol assessment tools. • Functional assessment
28	**Machalicek et al 2014**	Book Chapter Review	USA	Children	**ASD**	Verbal /written instructions. Sibling/ family mediated interventions	**Home**	Communication Family support	• Training on functional communication can decrease parent stress • Siblings can support implementation and generalisation of VS.
29	**Meadan et al 2011**	Descriptive	USA	0-5	**ASD**	Visual Timetable Sequence Charts Environmental Visual Labelling Social Story Rule Reminder Boards Visual Rule Reminder Cards	**Home** School	Practical ideas regarding the use of visual approaches for teachers and parents	• VS should be tailored and individualised assessment of the type of visual representation • Consider cost; time to prepare material; teaching personnel; comfort levels of staff and family.
30	**Rao & Gagie (2006)**	Descriptive	USA	Children	**ASD**	Choice Board Social Story Communication Passport Home- school diary PECS Visual Timetable TEACCH	**Home** School	Practical ideas regarding the use of visual approaches for teachers and parents	• Supports use of individualised VS across settings. • Describes how to implement VS. • Access to information on VS required • Advise being responsive to family needs to promote generalisation.

Table 6. Summary of qualitative studies measuring the view of parents with a child with ASD and/ or Developmental Delay, or professionals in relation to VS.

	Author (Publication Year)	Study Design	Country	Age range	Sample Size (n)	Diagnosis	Type of Visual Support Reported	Environment	Target skill/aim of study	Key Outcomes Reported:
31	**Donato et al (2014)**	Qualitative	Australia	0-5	Focus groups: Parents = 4 Educators = 4 Health Professionals = 5	**ASD,** PDD or global develop-mental delay.	Real objects Photographs and pictures Technology based VS PECS, Proloquo2Go (visual and audible supports) Boardmaker TM software with Sounding Board	Nursery	To identify the barriers and facilitators to the implementation of VS to inform the implementation of a Visual Language programme in early years settings.	**Barriers identified** Lack of time; Limited services, Negative attitudes within society. Inconsistent use across settings. **Facilitators identified** Having access to information and evidence of VS, increased awareness of visual supports, access to a bank of VS and use of mobile technologies. Parents expressed a preference for mobile technologies over low technology.
32	**Hayes et al (2010)**	Qualitative	USA	1-3	13 Staff interviews and Focus groups with 8 staff	**ASD**	Interactive visual supports	School	Design guidelines for interactive visual supports	• Traditional VS require time to make, implement, adapt and store. • Guidance reported for interactive VS based on professional focus groups and interviews
33	**Hines, Balandin & Togher (2011)**	Narrative analysis	Australian	31-44	16 parents 13 children	**ASD**	Any visual supports or use of Alternative and Augmented communication (AAC)	**Home**	AAC communication experiences of older parents who had an adult son or daughter with ASD.	• Most families had not used AAC as it was not available when their children were young (now adults).

										• Most did not express the need for such services. • Communication breakdown featured prominently in parents' narratives about interactions with their son/daughter.
34	**Stoner et al (2007)**	Qualitative	USA	6-8	4 parents	**ASD**	Visual Timetable Sequence Chart Home/ School Diary Child Profile Social Story for Dentist	**Home** School Community	Parent views on transitions	• Parents preferred child-centred transitions. • Home/ school communication was considered crucial to a successful transition. • VS identified as useful in transitions

Table 7: Parent Questionnaire data

Demographics		**Number**	**%**
Age currently	3-4 years	5	16.7
	5-8 years	13	43.3
	9-12 years	10	33.3
	13-14 years	2	6.7%
Age diagnosed with ASD	0-2 years	2	6.7
	3-4	11	36.7
	5-6	6	20
	7-8	4	13.3
	9-10	7	23.3
Type of school attended	Local Authority Mainstream school	28	93.3
	Local Authority Special school	1	3.3
	Private school	1	3.3
Who completed questionnaire	Mum	25	83.3
	Dad	2	16.7
Which Professionals have been involved with your child and family?	**Worked with our child/ family n/30**	**Provided visual supports n/30**	**When involved – what proportion of staff in this profession provided support with home visual supports**
SLT	29	10	34.5%
OT	23	5	23%
Specialist Visiting Education Staff	21	15	71.4%
CAMHS	7	7	14.3%
Paediatrician	26	0	0%
Educational Psychologist	16	1	6.3%
Early Years or School staff	24	14	58.3%
Respite	10	4	10%
Help given	**yes**	**no**	**No response**
Were you given visual supports by professionals	19	8	3
If given visual supports did they work well	16/30	2/30	12/30
Was the person who gave you visual supports helpful	18/18	0/18	12/30
If it was difficult were you given help to carry on	9/14	5/14	16/30

Table 8: Staff questionnaire results

What is your profession	**n/54**	**%**
SLT	11	20.4
OT	10	18.5
Teacher	12	22.2
Early Years practitioner/ nursery nurse	14	26.0
Service manager	3	5.6
Health visitor	1	1.9
Pupil Support Assistant	3	5.6
What age range do you work with	**n/71**	**%**
Pre-school	14	19.7
Primary	20	28.2
Both	37	52.1
Are Home visits part of your role	n/70	%
Yes	63	90.0
No	7	10.0

Table 9: Thematic Analysis

Themes from focus groups	**Sub themes from parents and professionals**
Accessibility	• Pre-diagnosis/ timely/ early intervention • Information about VS alongside resources • Pre-made resources (for the time- poor) • Individualised resources • Means to create own VS (empower families)
Participation focussed	• Meaningful • Relevant to child and environment • Keep in mind family needs/ demands • Purposeful • Opportunities to use them daily • Supporting social communication as well as following direction • Portable
Individualised planning	• Essential in observation/ assessment, reaching and review • Professionals seeking structures tools • Parents like to be involved as partners • Involve child where appropriate • Family readiness is a factor: (e.g. Acceptance and understanding of diagnosis; family circumstances, organization, other priorities; family needs to be at right stage)
Teaching methods	• Trusting relationships • Confidence and knowledge in what to teach • Persistence • How to teach child to use VS • How to teach adults to support child to use VS • Practical help • Modelling/ coaching • VS should be demonstrated/encouraged in a range of contexts – don't assume generalisation will occur • Ongoing forum to discuss next steps and troubleshoot
Consistency	• Same symbols, shared plan • A lead person to link with • Between home and school • From class to class/ year to year • Between family members • Good communication

	• Consistent messages between professionals • Resources which help (e.g. home school diary with VS, communication passports)
Information and Training	• Different formats (e.g. video clips, apps, websites, online resources • Also face to face, people to talk to • Right pace and amount of information (don't overwhelm) • Availability of parent group training/ workshops • Learning from other parents • Location – at home • In isolation VS do not provide adequate support – and should be seen as part of an overall package of support for communication/behaviour